

## **3.0 Description of Proposed Rail Corridors & Alternatives**

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### **3.1 DOE PROPOSED RAIL CORRIDORS AND ALTERNATIVES**

This Section describes the Caliente Rail Corridor (CRC) as well as the associated alternative segments that lie within the boundaries of Lincoln County, Nevada. A map depicting the CRC and alternatives is included in Figure 4.1.

#### **3.1.1 Alternative Segments at the Interface with Union Pacific Mainline**

DOE included two alternative segments to connect the proposed railroad to the existing Union Pacific Railroad (UP) mainline in or near the City of Caliente, Nevada. The Caliente Alternative Segment is the DOE's Preferred Alternative as outlined in the *Draft Environmental Impact Statement for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, Nevada* (DEIS-RA) (DOE, 2007). The second alternative the DOE included in its DEIS-RA for this segment is the Eccles Alternative. The descriptions of these Alternatives have been taken directly from the DEIS-RA (DOE, 2007).

##### *3.1.1.1 Caliente Alternative*

The Caliente Alternative Segment would begin in Caliente, enter Meadow Valley at Indian Cove, and extend generally north through Meadow Valley and along U.S. Highway 93. This Alternative Segment would then cross U.S. Highway 93 about 5 kilometers (3 miles) southwest of Panaca and connect to Caliente Common Segment 1 about 1 kilometer (0.6 mile) northwest of U.S. Highway 93 and 18 kilometers (11 miles) south of Pioche. The Caliente Alternative Segment would be approximately 18 kilometers long (DOE, 2007).

##### *3.1.1.2 Eccles Alternative*

The Eccles Alternative Segment would begin along Clover Creek about 8 kilometers (5 miles) east of Caliente and trend generally north to enter Meadow Valley from the southeast. This Alternative Segment would then cross U.S. Highway 93 about 5 kilometers (3 miles) southwest of Panaca and connect to Caliente Common Segment 1 about 1 kilometer (0.6 mile) northwest of U.S. Highway 93 and 18 kilometers (11 miles) south of Pioche. The Eccles Alternative Segment would be about 19 kilometers (12 miles) long (DOE, 2007).

#### **3.1.2 Caliente Common Segment 1**

The Caliente Common Segment 1 is approximately 71 miles in length. In the DEIS-RA, this portion of the Caliente Rail Alignment is simply referred to as the Caliente Common Segment 1. This report analyzes another alternative route commonly referred to as the Lincoln County Short Route. For ease of review, the DOE's Caliente Common Segment 1 was divided into two subsections -- Caliente Common Segment 1A and Caliente Common Segment 1B, dividing at the point at which the Lincoln County Short Route diverges from the DOE Common Segment 1. This point of divergence is located west of Bennett Pass near The Bluffs, on the west side of the Chief Range or the east side of Dry Lake Valley. The description of Caliente Common Segment 1 is as follows:

Common Segment 1 would begin at the end of the Caliente or Eccles Alternative Segments, and trend generally west from Meadow Valley through the Chief Range (Bennett Pass) and

across Dry Lake Valley and the North Pahroc Range. On the west side of the North Pahroc Range, Common Segment 1 would cross Nevada Route 318 near Timber Mountain about 5 kilometers (3 miles) southeast of the Lincoln and Nye County line. It would continue to the northwest and then west, passing the northern end of the Seaman Range before turning southwest through Coal Valley. It would then connect to one of the Garden Valley Alternative Segments about 8 kilometers (5 miles) north of the Lincoln and Nye County line and 28 kilometers (17 miles) west of Nevada Route 318 (see Figure 2-7). Caliente Common Segment 1 would be approximately 110 kilometers (71 miles) long (DOE, 2007).

### **3.1.3 Garden Valley Alternative Segments**

The CRC currently under consideration by the DOE requires passage through Garden Valley. The DOE has labeled these alternatives as Garden Valley Alternative Segments 1, 2, 3 and 8. These Segments run generally east to west with 3 being the northernmost, followed by 1, and 2, with 8 being the southernmost. This report adopts the DOE naming convention to assist the reader in comparing the information contained herein with the DEIS-RA. The descriptions of these alternative segments have been taken directly from the DEIS-RA.

#### *3.1.3.1 Garden Valley Alternative Segment 1*

Garden Valley Alternative Segment 1 would begin at the end of Caliente Common Segment 1 and run due west through the Golden Gate Range for about 7 kilometers (4 miles), trend in a southwesterly direction through Garden Valley, cross the Lincoln and Nye County line, and connect to Caliente Common Segment 2 about 5 kilometers (3 miles) north of the Worthington Mountains Wilderness Area. Garden Valley Alternative Segment 1 would be approximately 35 kilometers (22 miles) long (DOE, 2007).

#### *3.1.3.2 Garden Valley Segment 2*

Garden Valley Alternative Segment 2 would begin at the end of Caliente Common Segment 1 and run to the south of the locations of Garden Valley Alternative Segments 1 and 3 (see below), crossing the Lincoln and Nye County line. Garden Valley 2 would continue southwestwardly through the Golden Gate Range at Water Gap, turn westward through Garden Valley, and continue southwesterly to connect to Caliente Common Segment 2 about 5 kilometers (3 miles) north of the Worthington Mountains Wilderness Area. Garden Valley Alternative Segment 2 would be about 35 kilometers (22 miles) long (DOE, 2007).

#### *3.1.3.3 Garden Valley Alternative Segment 3*

Garden Valley Alternative Segment 3 would begin at the end of Caliente Common Segment 1 and run due west through the Golden Gate Range and then in a northwesterly direction until turning southwest to run along the southeast base of the Quinn Canyon Range. Continuing in a southwesterly direction, it would run through Garden Valley, cross the Lincoln and Nye County line, and connect to Caliente Common Segment 2 about 5 kilometers (3 miles) north of the Worthington Mountains Wilderness Area. Garden Valley Alternative Segment 3 would be approximately 37 kilometers (23 miles) long (DOE, 2007).

#### *3.1.3.4 Garden Valley Alternative Segment 8*

Garden Valley Alternative Segment 8 would begin at the end of Caliente Common Segment 1 and run to the south of the locations of Garden Valley Alternative Segments 1 and 3, crossing the Lincoln and Nye County line and paralleling Cherry Creek Road. It would continue southwestwardly through the Golden Gate Range at Water Gap, turn westward

through Garden Valley, parallel Garden Valley Road, and run in a southwesterly direction before turning sharply westward. Garden Valley Alternative Segment 8 would proceed westward and connect to Caliente Common Segment 2 about 5 kilometers (3 miles) north of the Worthington Mountains Wilderness Area. Garden Valley Alternative Segment 8 would be about 37 kilometers (23 miles) long (DOE, 2007).

### **3.1.4 Caliente Common Segment 2**

Common Segment 2 is only partially contained within Lincoln County and therefore this report only addresses impacts along a portion of this Segment. The description in the DEIS-RA for the Caliente Common Segment 2 is as follows: It would begin at the west end of Garden Valley and would trend southwest through Sand Springs Valley, where it would exit Lincoln County and enter Nye County. It would cross State Route 375 near the south end of Railroad Valley before connecting to one of the South Reveille alternative segments near the southern end of the Reveille Range. Caliente Common Segment 2 would be approximately 50 kilometers (31 miles) long (DOE, 2007).

## **3.2. ADDITIONAL CALIENTE RAIL ALIGNMENT OPTIONS**

The Joint City County Impact Alleviation Committee (JCCIAC) recommended and the Lincoln County Commission approved the detailed analysis of two alignment alternatives not included in the DEIS-RA. After evaluating several options, the preparers of this report performed detailed analysis on the Cottontail Pass Alternative and the Lincoln County Short Route Alternative.

### **3.2.1 Lincoln County Cottontail Pass Alternative**

The majority of the Caliente Rail Alignment would remain unchanged from the DOE's proposed alignment and alternatives. The line would initiate at Caliente or Eccles and continue on Caliente Common Segment 1. However, instead of the proposed entrance into Garden Valley through Water Gap, this Alternative would traverse Cottontail Pass. Cottontail Pass is located four miles south of Water Gap (Approximate UTM, NAD 1927, zone 11: 4205083 m. North, 641292 m. East). The elevation of the Cottontail Pass Summit is 5440 ft. at a distance of 3.3 miles from the West Coal Valley Road. There is an elevation gain of 413 feet between the road and the top of the pass. Cottontail Pass enters Garden Valley at a gradual slope. This Alternative would join the DOE's CRC where the Garden Valley Alternative Segments and Common Segment 2 join together.

### **3.2.2 Lincoln County Short Route Alternative**

The eastern portion of the Lincoln County Short Route would follow the same alignment as the DOE Proposed Caliente Corridor from the UP mainline, including either the Eccles or Caliente Alternative Segment and a portion of Common Segment 1. The Lincoln County Short Route would diverge from Common Segment 1 of the DOE Proposed Caliente Corridor west of Bennett Pass near The Bluffs. From this point to the east side of Hancock Summit, the Lincoln County Short Route follows the alignment described by the 1992 Caliente Rail Access Studies "Option A" (De Leuw *et al.*, 1992). From the point of divergence it would travel southwest along the eastern edge of Dry Lake Valley parallel to an existing power transmission access road. The route would then turn westerly and run parallel to US Highway 93 on the north side through Dry Lake and Pahroc Valleys. At the northern tip of the South Pahroc Range, the route would turn somewhat southwesterly, diverging from the US Highway 93 alignment as it crossed Sixmile Flat. The route would wind through Hiko Canyon and across a portion of private property and Nevada State Route 318 in Pahranaagat Valley before turning southwesterly. The route would top the Pahranaagat Range near Hancock Summit, approximately 1 mile north of Nevada State Route 375, crossing it on the eastern side of Tikaboo Valley at the toe of the

Pahranagat Range. From there the route would travel southwesterly along the Groom Lake Road to a point where it would enter the Nevada Test and Training Site (NTTS). The project team did not have the access or resources to continue the alignment from the entry point with the Nellis Air Force Range to Yucca Mountain, but several viable options would be available including a portion of the Caliente-Chalk Mountain Route previously studied by DOE. The Departments of Energy and Defense would need to work closely in order to complete an alignment that did not interfere with the NTTS or Nellis Air Force Range operations. The project team viewed this as a major benefit for this route as the NTTS is already a highly disturbed environment with limited public access. Based on total length, this alignment would be significantly shorter than the CRC.

### **3.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS**

Numerous alternatives were considered but eliminated from Detailed Analysis. This Section includes the written descriptions of these alternatives as well as the justification for their elimination from detailed analysis.

#### **3.3.1 Blind Canyon Alternative**

The majority of the Caliente Rail Alignment would remain unchanged from the DOE's proposed alignment and alternatives through Lincoln County. The line would initiate at Caliente or Eccles, and continue on Caliente Common Segment 1 until reaching the junction with the Lincoln County Cottontail Pass Alternative. The Blind Canyon Alternative follows the Cottontail Pass Alternative southward along the west side of Coal Lake Valley, extending two miles further south of Cottontail Pass to reach Blind Canyon. This southern entrance to Garden Valley would make this Alternative less visible from the 'City art site than the Cottontail Pass Alternative, however it would present more engineering challenges. It would exit Garden Valley in the same location as the other Garden Valley Alternative Segments. Blind Canyon is located six and a half miles south of Water Gap, (approximate UTM: 4201040 m. North, 640284 m. East). The Blind Canyon Alternative was eliminated from detailed analysis because it would have added length to the CRC, required extensive earthwork or tunneling, and would not have bypassed Garden Valley.

#### **3.3.2 Murphy Gap Alternative**

The Murphy Gap Alternative would completely bypass Garden Valley and reconnect to the existing DOE Preferred Alternative in Sand Springs/Penoria Valley. The Murphy Gap Alternative was eliminated from detailed analysis because it would not have lessened the overall impacts to grazing permittees but rather would have simply shifted the burden from one set of permittees to another. Additionally, the Murphy Gap Alternative would have presented more engineering and construction challenges than the DOE Preferred Alignment.

#### **3.3.3 Crystal Wash Alternative**

The Crystal Wash Alternative was a potential variation of the Lincoln County Short Route that would diverge from the Short Route at Pahroc Summit. From there it follows U.S. Highway 93 to the junction of Lincoln County State Route 375, which it then follows through Crystal Springs, rejoining the Short Route in the western portion of Pahranagat Valley. This Alternative was removed from consideration because it lacked the strengths of the Lincoln County Short Route.

#### **3.3.4 West Sixmile Alternative**

The West Sixmile Alternative was a potential variation of the Lincoln County Short Route, which would avoid the private property concerns around Hiko. This Alternative would require bridging or tunneling, and travels through a pass approximately five miles north of Hiko Canyon. The rail

line would follow a route along the hills in north Sixmile flat, maintaining an altitude of approximately five thousand feet through a pass south of the John Wright Reservoir and north of the Stewart Ranch private property. The West Sixmile Alternative was eliminated from detailed analysis because the Lincoln County Short Route (which was selected) most closely resembled an alternative previously evaluated and established as a feasible alternative by the DOE.

### **3.3.5 Hancock Summit 1 Alternative**

This was a potential alternative to the portion of the Lincoln County Short Route that crosses Hancock Summit. Hancock Summit 1 Alternative would cross through a pass that crosses the West Pahrnatag range from Pahrnatag Valley on the east side. It passes into Tikaboo Valley on the west. It is located south of the Lincoln County power line, which provides power to Rachel, Nevada, and runs north of Highway 375. The altitude of the pass is 5,601 ft. The west side of Hancock Summit 1 is much steeper than the east side. A tunnel ranging from one, to one and a half miles in length would be needed to maintain a two percent rail grade through this canyon and connect with the Groom Lake Road. The Hancock Summit 1 Alternative was eliminated from detailed analysis because the Hancock Summit Alternative included in the Lincoln County Short Route more closely resembled an alternative previously evaluated and established as feasible by the DOE.

### **3.3.6 Hancock Summit 2 Alternative**

This was a potential alternative to the portion of the Lincoln County Short Route that crosses Hancock Summit. The Hancock Summit 2 Alternative would cross through a pass from Pahrnatag Valley through the West Pahrnatag Mountains. The pass is located 1.5 miles south of Highway 375 Hancock Summit at an elevation of 6,012 feet. The route to this pass would require crossing Hwy 375 north of the "Sharp" livestock water haul on the east, and climbing through steep canyons to the pass (Approximate UTM: 4141496 m. North, 646092 m. East). From the pass a route west to the Groom Road would require extensive cut and fill and/or tunneling. The Hancock Summit 2 Alternative was removed from consideration because it appeared to offer more engineering challenges than the Hancock Summit 1 Alternative that was selected as part of the Lincoln County Short Route.

### **3.3.7 Indian Cove Alternatives**

Two alternatives were identified near Indian Cove, which is located 2 miles north of the City of Caliente (Approximate UTM: 4170390 m. North, 721018 m. East). Indian Cove is a narrow canyon with steep limestone cliffs jutting skyward. Highway 93, the old Pioche Rail line, Meadow Valley Creek, natural wetlands, and pasture are all contained within the Cove in a narrow canyon that opens into Meadow Valley Range to the north. This is an area that was previously studied by DOE as a route from Caliente to Yucca Mountain. In 1990 DOE planned to use a bridge at Indian Cove that would allow a rail line to cross Meadow Valley with minimal impact on private land (Tappen *et al.*, 1990). The route would have had a rail line leave the UP at Eccles Siding and continue west bridging Indian Cove in order to avoid private property in the Meadow Valley.

The second Indian Cove Alternative is located about one-quarter mile south of the first Indian Cove Alternative. There is a steep, rocky canyon that opens up into a juniper forest that is crisscrossed by ATV and jeep roads. The summit of this canyon is at approximately 5,300 feet above sea level. The summit is located on the south end of the Chief Mountain Range. The

team was not able to consider the Indian Cove Alternative for detailed analysis due to time constraints.

### **3.3.8 Antelope Canyon Alternative**

This alternative was initially identified by L&H Consulting, but was not included as part of this report due to questions of engineering feasibility and time constraints. Lincoln County subsequently contracted with Energy and Railroad Consulting. Mr. Jerry Parker from Energy and Railroad Consulting is preparing a report entitled *Comments and Recommendations on the 2007 Draft Environmental Impact Statement for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, Nevada*. This Alternative is more fully evaluated in that report. The Antelope Canyon Alternative could be used to link the Union Pacific mainline to either the DOE proposed CRC or the Lincoln County Short Route in Dry Lake Valley. Although not evaluated within this report, this Alternative could alleviate impacts to private lands identified in Meadow Valley and impacts to public land grazing identified in and around Bennett Pass.